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WITNESS my hand this
Twentieth day of August 2003

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PROVISIONAL SPECIFICATION
FOR A PROVISIONAL PATENT

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Invention Title: **Shutter Arrangement**

The following statement is a description of this invention

Shutter Arrangement

The present invention relates to shutter assemblies. A preferred aspect of the invention relates to shutter assemblies capable of assembly from modular units.

Co-pending Australian patent application No. PR 2282 and PR 2283 both filed on 22 December, 2000 also relate to a cassette for a shutter assembly and the entire contents of both of those specifications are incorporated herein by reference.

Shutter assemblies have been described in which a plurality of louvre blades are rotationally set in a frame to rotate about axes in a single plane. The louvre blades are adapted to pivot in a synchronised manner by connection to a common cord or slat extending transversely relative to the louvre slats and, in an arrangement set in a vertical plane, the cord or slat is adapted to move up or down in a vertical direction to pivot the louvre slats in unison. The frames in which the previously described shutter assembly is set is generally of a light construction requiring the inclusion of a mid rail to improve structural stability due to the small profile frame. The previously described louvre slats are generally pivoted about a small dowel or pin located in a single piece small section side rail.

It is an object of the first invention to provide a useful alternative to shutter assemblies previously described.

According to one aspect of the invention, there is provided a modular unit for a shutter assembly, said modular unit adapted to mount a shutter blade and including:

an elongate member unit stackable and engageable to like elongate member units to form an assembled elongate member; and

a support for a compact boss adapted to be engaged to the shutter blade, whereby rotation of the compact boss causes rotation of the shutter blade.

wherein the elongate member is adapted to facilitate the reciprocal travel of a translating member along or within the assembled elongate member and the support is adapted to support the compact boss for co-action with the translating member to translate the reciprocal motion of the translating member into rotational motion in the compact boss whereby to pivot the shutter blade.

The elongate member unit may be formed from one or more components. The elongate member unit may include a unitary integrally moulded or cast component. The elongate member unit may include two or more separately formed components adapted to be

joined together. The elongate member unit may be formed from a pair of separately formed components adapted to be engaged to one another to form the elongate member unit.

The engagement of the modular unit to adjacent like member units may include a variety of modular unit engagement means. For example, the modular unit engagement means may include male members adapted to engagedly co-operate with female members on an adjacent member unit. The male members may include headed pins. The modular unit engagement means may include snap lock locaters. The modular unit engagement means may include any one of apertures, grooves, tracks, slots or the like.

Preferably, the modular unit includes a pair of halves separately formed and having component engagement means. The component engagement means may include any suitable means for securing two or more such components together. The component engagement means may include similar means as that used for the modular unit engagement means. The component engagement means may be in the form of interference fit pins adapted to locate in corresponding apertures. For example, a first half of the elongate member unit may include at least one interference fit pin adapted to engage with at least one corresponding aperture in the other half.

The elongate member unit may define a cavity in which the translation member is adapted to travel. The elongate member may be assembled from modular units to form a housing defining an internal cavity. The assembled elongate member may be adapted to house a pair of opposed translation members adapted to co-act in unison with the compact bosses. The translating member may be in the form of a toothed rack adapted to co-act with a compact boss in the form of a toothed wheel or pinion.

The support may be in the form of a circular aperture in a wall of the elongate member unit. An opposed internal wall of the elongate member unit may include a recess or aperture to locate a spigot extending coaxially from the compact boss to stabilise the structure and facilitate the rotation of the compact boss about a constant axis. Alternative the internal wall may include a protrusion adapted to coaxially engage the compact boss mounted thereto for rotation.

The translating member may be adapted to co-act with a turning means. The turning means may be adapted to be controlled by an operator. The turning means may be manual. The turning means may be motorised. The turning means may be responsive to environmental conditions and diurnal cycles. For example, the shutter assembly may be automatically opened during daylight hours and closed during the night. The shutter assembly may be adapted to open in moderate temperature conditions and to close in

excessively cold or hot conditions. The shutter assembly may include environmental sensors suitable for the purpose.

The turning means may be adapted to co-act directly with the translating member. Preferably, the turning means is adapted to co-act with one of the compact bosses in an assembled elongate member. The turning means may include any standard mechanism adapted to translate the rotational motion of a rotatable handle about an axis normal to the plane of the shutter assembly into rotational motion about an axis parallel to the longitudinal axis of the shutter blade. For example, the turning means may include a worm gear arrangement. Alternatively, the modular unit may include a slot adjacent the translating member along which a manually controlled handle may travel to operate the translating member by acting directly on the translating member.

The shutter blades may be heated or cooled to facilitate the moderation of the temperature of the environment. For example, the shutter blades may include one or more cavities or conduits through which a fluid may flow. The fluid may be a liquid such as water, coolant or a combination of both which may flow to either heat or cool the shutter blades and, by convection or conduction, the ambient temperature surrounding the shutter blades. The shutter blades may include heating elements. For example, the shutter blades may include a thin film of myala comprising heating elements on the skin of the shutter blade.

The shutter blade may be insulated for sound and/or heat insulation.

The invention may be better understood from the following non-limiting description of one or more preferred embodiments, in which:

Figure 1 is a partially exploded perspective view of a prior art shutter arrangement;

Figure 2 is a partially exploded perspective view of a shutter arrangement according to one aspect of the invention;

Figure 3a is a perspective view of a two piece modular unit prior to assembly and showing a pair of translating members;

Figure 3b is a perspective view of the modular unit shown in Figure 3a from a different perspective;

Figure 4a is a front elevation of a first component of the modular unit shown in Figure 3a;

Figure 3b is a front elevation of a second component of the modular unit shown in Figure 3a;

Figure 4c is a side elevation of the modular unit shown in Figure 3a;

Figure 5a is a top plan view of the first component shown in Figure 4a;

Figure 5b is a top plan view of the second component shown in Figure 4b;

Figure 6a is a perspective view of a partially assembled elongate member;

Figure 6b is a perspective view of the elongate member of 6a in assembled form;

Figure 7a is an exploded view of a turning mechanism for use in the shutter assembly;

Figure 7b is an exploded view of a two piece modular unit;

Figure 7c is a partially cut away perspective view of an end cap for placement on the end of a shutter blade;

Figure 8 is an exploded perspective schematic view of the internal workings of a handle;

Figure 9a is an exploded perspective view of the turning mechanism;

Figure 9b is a schematic perspective view of a spigot located in an aperture in the external wall of a gear housing;

Figure 10a is a perspective view of a turning mechanism cover;

Figure 10 is a perspective view of the cover of Figure 10a rotated 90° and;

Figure 10c is a schematic representation of a motor housed in the cover.

Referring firstly to the example of the prior art shown in Figure 1, a frame is shown comprising a pair of small profile side rails 5a, 5b held together by interposed top-mid- and bottom-rails 6a, b, c. A plurality of shutter blades 7 are shown in the top section of the prior art shutter assembly 1 connected together for synchronised rotation by a side mounted control stick 8 which may be nailed or pinned into the end grain of the wooden shutter blades 7. An alternative arrangement is shown in the bottom section of the prior art shutter assembly 1 wherein a vertical control stick 9 is used to synchronise the rotation of blades 10 and is attached by staples or pins to the blades 10.

In the prior art shutter assembly 1 the shutter blades 7, 10 are pivotably mounted to the side rails 5a, 5b by small dowels or pins 11 located on the exposed end grain 12 of the blades 7, 10 and located in corresponding apertures 13 in the side rails 5a, 5b. A wood screw 14 is required to keep tension on the blades 7, 10. The top-mid-and bottom-rails 6a, 6b, 6c are secured to the side rails 5a, 5b by large dowels 15 adapted to be received in corresponding holes 16.

In contrast, a shutter assembly 20 made in accordance with one aspect of the invention is shown in Figure 2. The shutter assembly includes large profile side rails 21, 22. One of the side rails 22 may optionally be hinged 23 to a wall structure. The shutter assembly 20 does not include a mid rail but only top rail 24 and bottom rail 25 fixedly engaged to the side rails 21, 22 by tenon joints 26.

The shutter assembly 20 includes a plurality of shutter blades 27 extending between the side rails 21, 22. The mounting of the blades 27 to the side rail 21 may include a simple free pivot arrangement. However, the mounting of the plate 27 to the side rail 22 includes a translating mechanism 28. The translating mechanism 28 is controlled by a motor driven turning mechanism 29. It can be seen that, not only is the shutter assembly 20 frame less obtrusive relative to the prior art, but it is more visually appealing because the translating mechanism 28 is unobtrusive.

Turning now to Figures 3a and 3b, there is shown a two piece modular unit 30 including a first component 31 and a second component 32. A pair of opposed translating members in the form of toothed racks 33, 34 are included to clearly show their position in the modular unit 30 once assembled, but it will be appreciated that prior to assembly the first and second components 31, 32 do not include the racks 33, 34.

Each side wall of the first and second components 31, 32 include a truncated triangular section groove 35 suitable for mounting the assembled elongate member to a correspondingly configured bead (not shown). The first and second components are engageable by interference fit by two pairs of pins 36 located on the second component 32. The pins 36 are adapted to be inserted into apertures 37 located in the first component 31 to tightly engage the first and second components 31, 32 together. The assembled modular units 30 may be stacked in series one above the other by vertical engagement means in the form of elongate tongue 38 and groove 39 features whereby to form an elongate member.

The first and second components 31, 32 combine to form a large aperture 40 from the combination of a pair of aligned semi-circular cutouts. Coaxial with the large aperture 40 is a rounded protrusion 41 on an inner wall of the second component 32. The

protrusion 41 is adapted to locate within a corresponding recess of a compact boss (not shown) to ensure that the compact boss rotates about a constant axis.

Figures 4a, 4b, 4c, 5a and 5b more clearly show the various features of the modular unit.

Figure 6a shows a set of three modular units 30 stacked one on top of the other to form two parts of an elongate member 50. The elongate member 50 optionally includes the racks 33, 34 prior to assembly. The elongate members are built in series and able to be front loaded. They are therefore very easy to assemble (and retrofit in the future if a blade requires removal). The component 32 (see Figure 3a) is mounted to each opposing stile edge 28 of the frame including side rails 21,22 by male to female fitting (tongue and groove features) 38,39 which ensures accurate alignment along the line of groove 35 and tightly secured via features 38,39 which also guarantees the correct pitch of protrusion 41 being the pivotal pitch point for each and various sized blades 62 (see Figure 7c). The unique method of assembly following the securing of component 32 is to insert rack 34, followed by blade 62 which snaps into the semi-circle groove 39 of component 32. This is followed by laying rack 33 into the assembly wherein the gears of the rack 33 mesh with the pinion 61. Finally component 31 is snapped via pins 36 (see Figure 3a) into apertures 37 (see Figure 3b) ensuring the encapsulation of the rack and pinion assembly.

Referring to Figure 7a, the turning mechanism 29 is shown in detail. The turning mechanism 29 includes a handle 51 having a square sectioned spindle 52 adapted to rotatably co-operate with a worm 53 coaxially aligned with the spindle 52 whereby, when the handle 51 is rotated the worm 53 also rotates. Optionally, the relationship between the spindle 52 and the worm 53 may be geared and in such case, the spindle 52 and the worm 53 may not be coaxial.

The spindle is received through an aperture in a cover wall 54 of a housing 55. The housing 55 optionally includes a turning motor (see Figure 10c) in which case the handle 51 is in the form of a bi-directional motor actuator.

The worm 53 is rotatably mounted in a cylindrical bore or semi-cylindrical channel 56 of a gear housing 57. The gear housing 57 includes a toothed wheel gear 58 set for rotation in a tight fitting cylindrical bore in the gear housing 57 whereby the wheel gear 58 rotates about an axis normal to that of the worm 53.

Extending outwardly from the wheel gear 58 is a gear spindle 59 on which may be mounted a compact boss (not shown) adapted to co-act with the racks 33, 34 shown in

Figure 7b. The square sectioned end 60 of the gear spindle 59 is adapted to engage a correspondingly square sectioned bore 61 set in an end cap 62. The end cap 62 shown in Figure 7c is adapted to fit over the end of the shutter blade 27 shown in Figure 2 as a end sleeve in a tight interference fit.

Referring to Figure 8, the internal structure of the handle 51 is shown in more detail. The handle 51 includes a spindle 52 over which is circlip retaining 63 is placed. The spindle 52 forms a hollow square sectioned shaft adapted to receive a corresponding square section male portion 64 of the worm 63.

Referring to Figure 9a, the handle 51 is mounted for rotation by means of a boss 66 engagedly mounted in a correspondingly toothed aperture 65 extending through the housing 55. As shown in Figure 10c the housing may include a motor such as a small electric motor actuable by the handle 51 and configured to rotate the spindle 52 which in turn rotates the worm 53.

As shown in Figure 9b the end of the gear spindle 59 opposed to the square sectioned end 60 is cylindrical in cross-section and is adapted to freely rotate in a circular aperture of the exterior wall 69 of the gear housing 57.

Figures 10a and 10b show the turning mechanism housing 55 from different perspectives. The handle housing 55 includes a front facia 70 from which extends four shallow walls 71 defining a cavity within which a motor may be housed.

Throughout the specification the word "comprise" and its derivatives are intended to have an inclusive rather than exclusive meaning unless the context requires otherwise.

It will be appreciated by those skilled in the art that many modifications and variations may be made to the embodiments described herein without departing from the spirit or scope of the invention.

Dated this 24th day of August, 2001

Robert Phillip Griffiths

By his Patent Attorneys

Chrysiliou Law

FIG.1

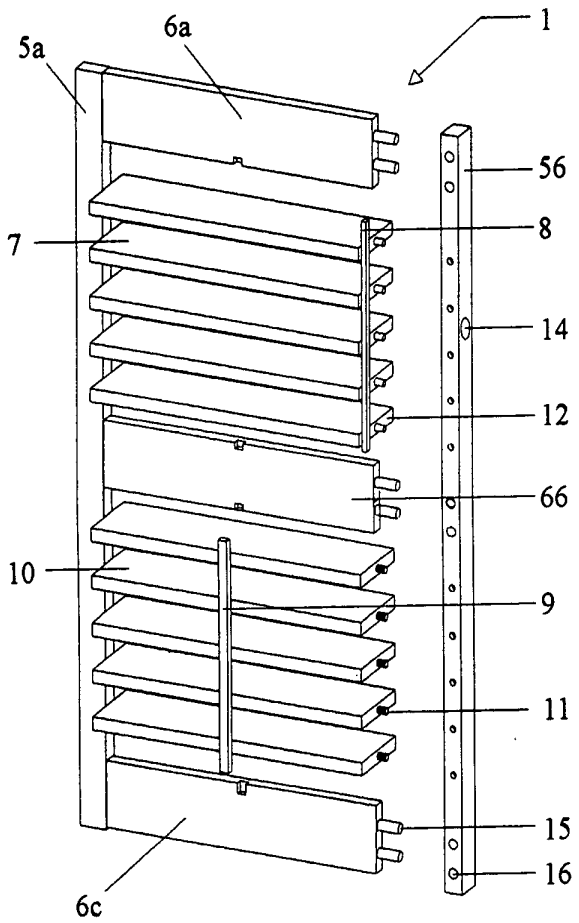
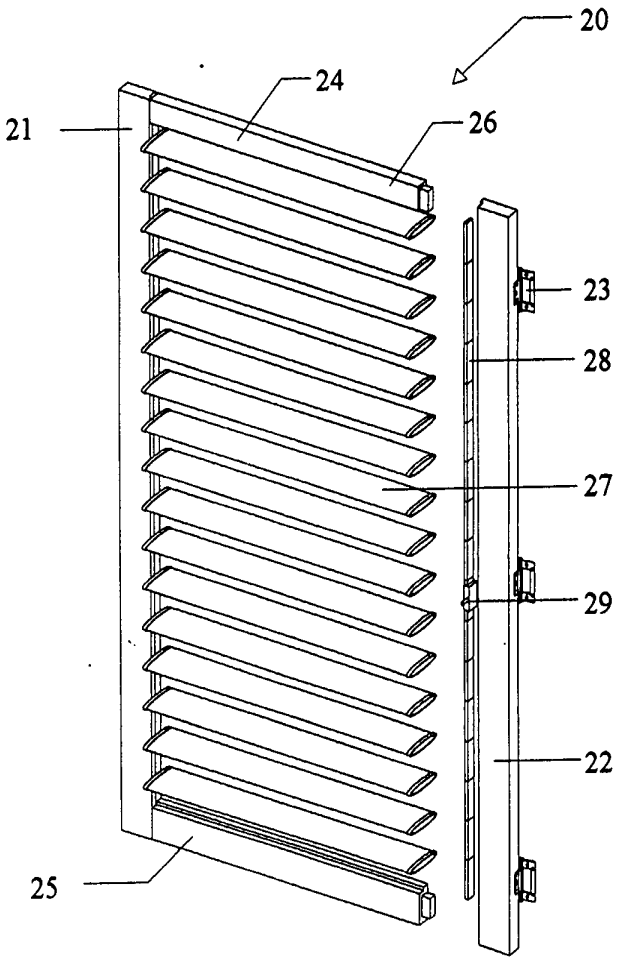


FIG.2



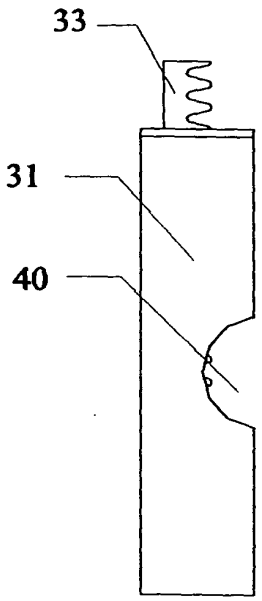


FIG. 4a

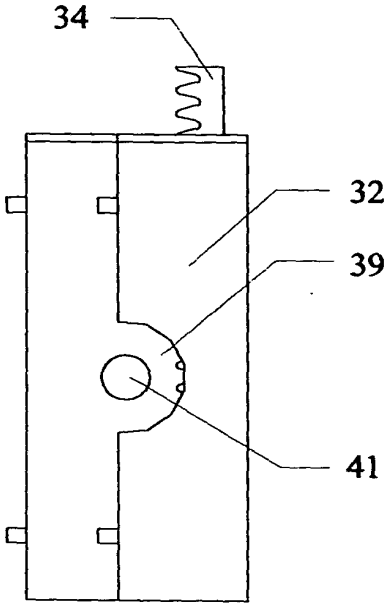


FIG. 4b

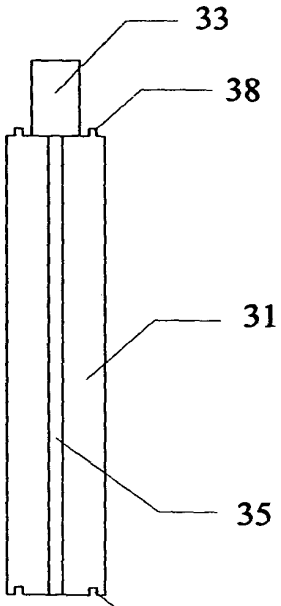


FIG.4c

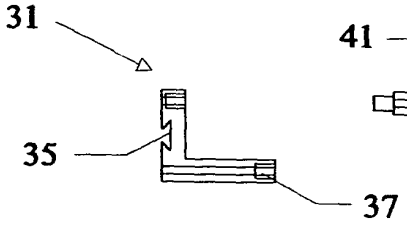


FIG. 5a

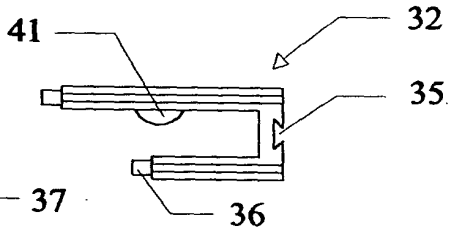


FIG. 5b

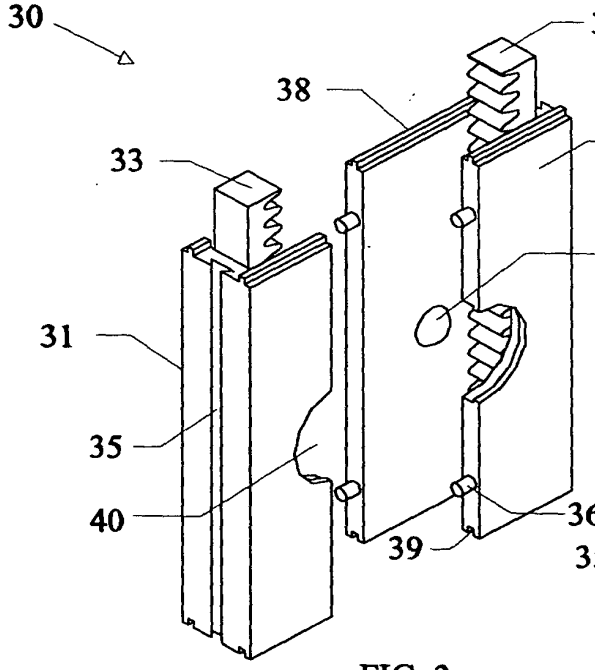


FIG. 3a

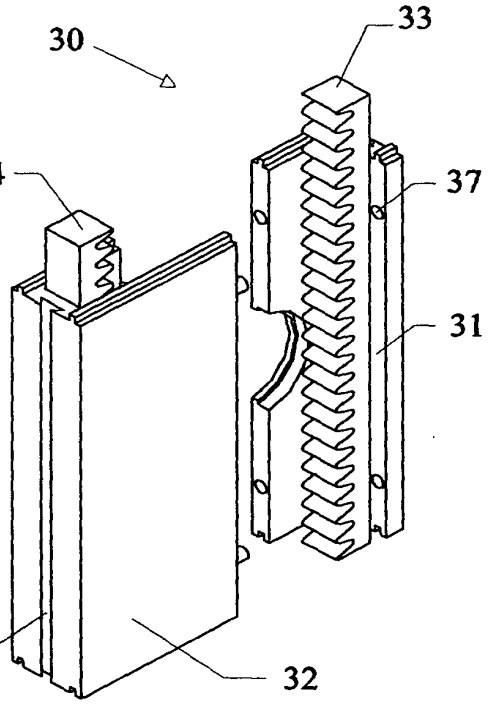


FIG. 3b

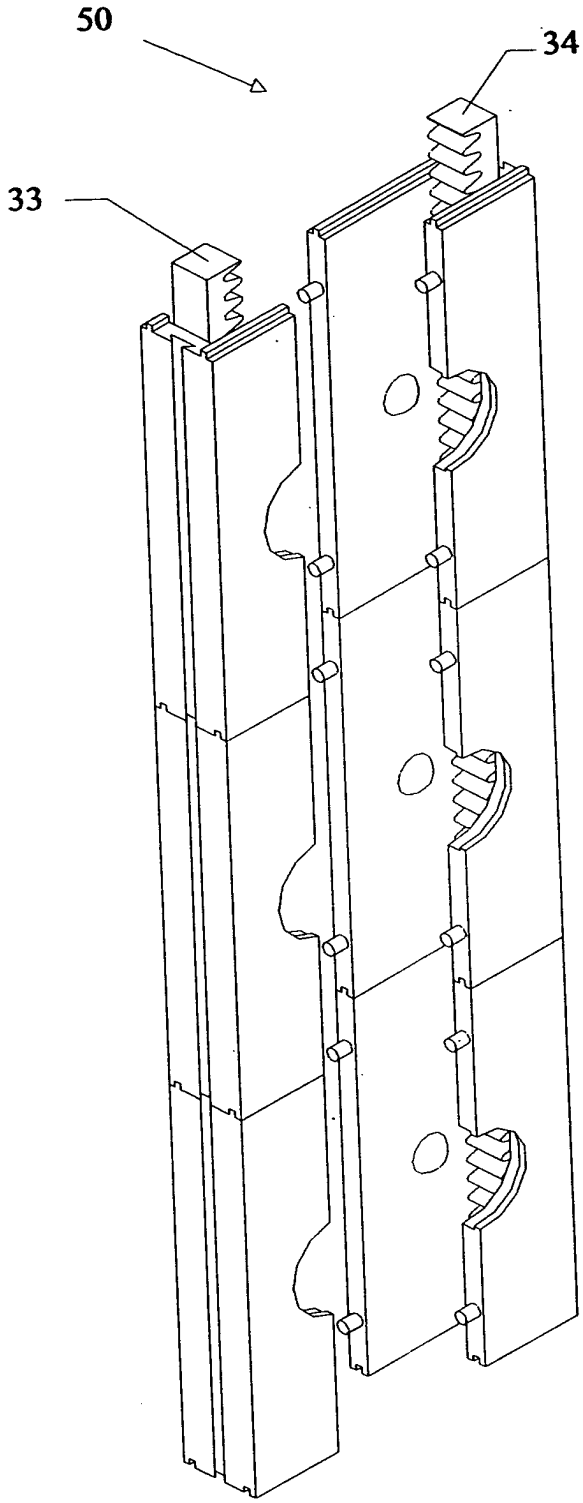


FIG. 6a

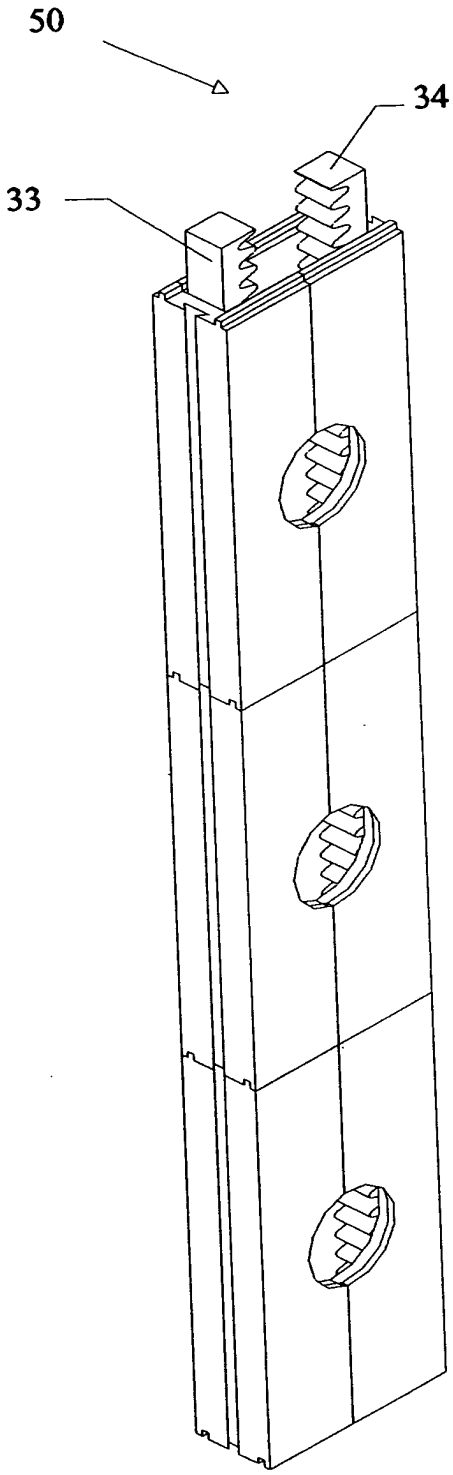


FIG. 6b

FIG. 7b

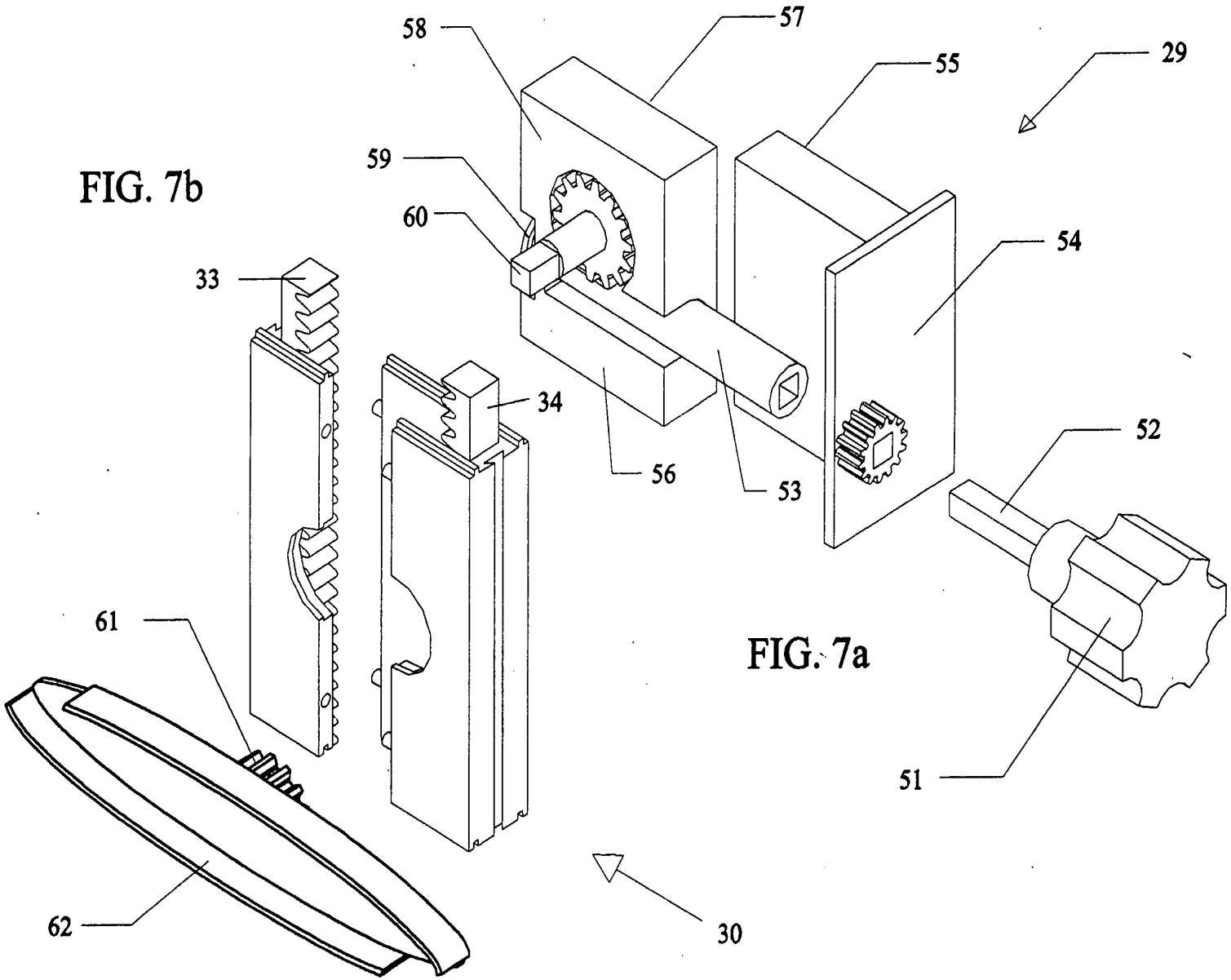


FIG. 7a

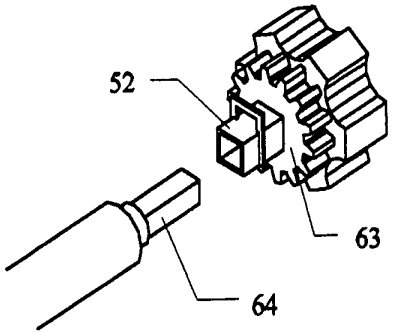


FIG.8

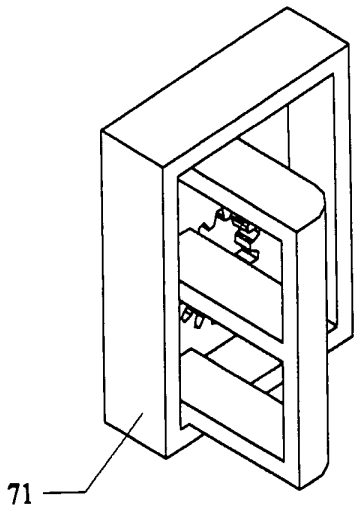


FIG.10a

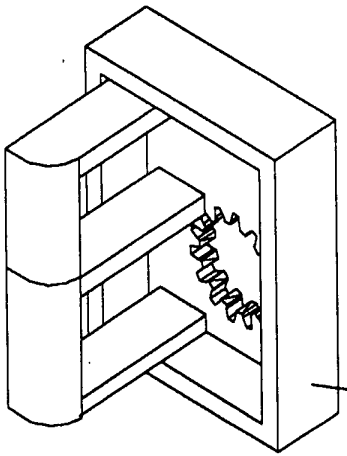
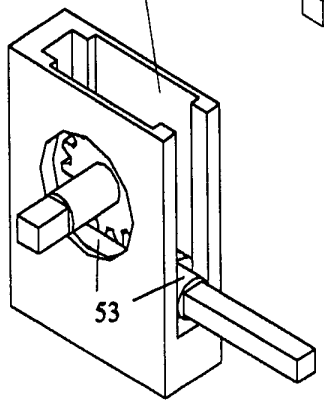


FIG.10b



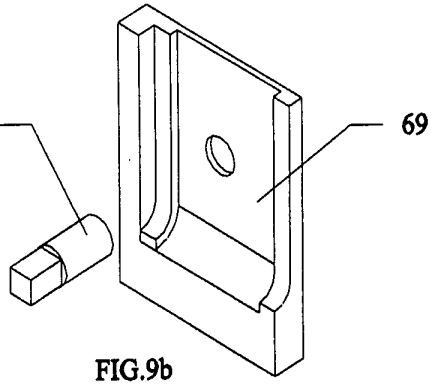


FIG.9b

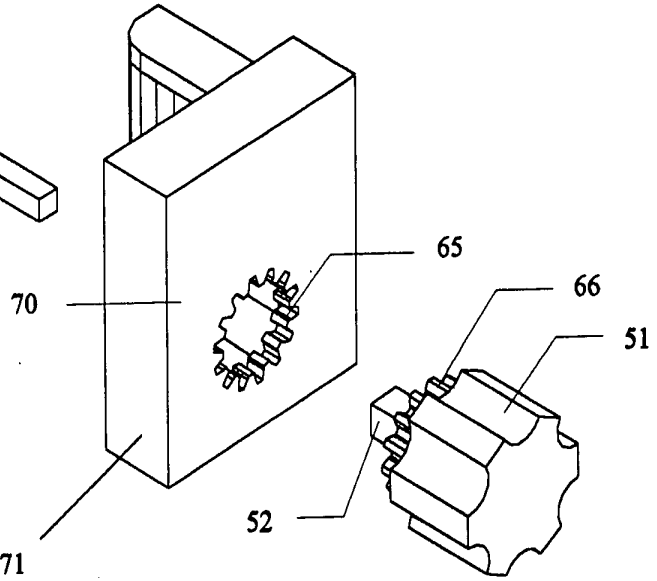


FIG.9a